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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,930	03/10/2004	Hongbin Zhang	TCM215/1072	3259

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MANCHESTER, NH 03101

EXAMINER	
LAVARIAS, ARNEL C	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/796,930	Applicant(s) ZHANG ET AL.	
	Examiner Arnel C. Lavarias	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/26/05,3/7/05,8/2/04,6/24/04,3/10/04*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *3/10/04,6/24/04,8/2/04* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/26/05,6/24/04*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendments to the specification in the preliminary amendment filed 6/24/04 are acknowledged and accepted.

Drawings

2. The originally filed drawings were received on 3/10/04. The replacement drawings were received on 6/24/04 and 8/2/04. These drawings are acceptable.

Specification

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. *It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.*

4. The abstract of the disclosure is objected to because of the following reasons:

Abstract, line 2- delete 'are provided'

Abstract, line 5- 'desires' should read 'desired'.

Correction is required. See MPEP § 608.01(b).

5. The disclosure is objected to because of the following informalities:

Paragraph 0035, line 2- 'in' should read 'to'

Paragraph 0037, line 10- insert 'to' after 'SOP'

Paragraph 0040, line 10- insert 'is' after 'that it'

Paragraph 0045, line 3- '428' should read '426'.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 22, 25-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Shieh (U.S. Patent No. 6384956).

Shieh discloses a method of controlling a state of polarization (See for example Figures 1-2) comprising providing a plurality of waveplates (See for example 100, 102, 104, 106, 200 in Figures 1-2); continually adjusting a first one of the plurality of waveplates along a first rotation direction while a feedback signal satisfies a first condition (See col. 3, line 27-col. 4, line 3, wherein the first condition may refer to one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced); ceasing adjusting the first waveplate if the feedback signal does not satisfy the first condition; continually

adjusting a second one of the plurality of waveplates along a second rotation direction while the feedback signal satisfies a second condition (See col. 3, line 27-col. 4, line 3, wherein the second condition may refer to a condition similar to the first condition, i.e. one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced); ceasing adjusting the second waveplate if the feedback signal does not satisfy the condition; continually adjusting a third one of the plurality of waveplates along a third rotation direction while the feedback signal satisfies a third condition (See col. 3, line 27-col. 4, line 3, wherein the third condition may refer to a condition similar to the first and second condition, i.e. one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced); and ceasing adjusting the third waveplate if the feedback signal does not satisfy the third condition. Shieh additionally discloses the waveplates arranged in a serial fashion and adjusted sequentially (See Figures 1-20; col. 3, line 59-col. 4, line 3); each of the waveplates functions as a quarter waveplate and are not associated together as a half waveplate (See col. 3, lines 4-26); the first, second, and third conditions are equivalent (i.e. the first, second, and third conditions may refer to one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced); the plurality of waveplates comprise a polarization controller (See Figures 1-2); a first subset of the plurality of waveplates comprise a first polarization controller, and a second subset of the plurality of waveplates comprise a second polarization controller (See for example each individual

waveplate 100, 102, 104, 106, 200 in Figures 1-2); and the input optical signal comprising at least one pair of channels, the pair of channels being orthogonally polarized with respect to each other (it is noted that this limitation is inherent to the signal beams incident to the polarization controller since any unpolarized light beam may be decomposed into two beams that have polarizations that are orthogonal to each other).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-4, 17, 20, 40-48, 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann (F. Heismann, 'Analysis of a Reset-Free Polarization Controller for Fast Automatic Polarization Stabilization in Fiber-optic Transmission Systems', J. Lightwave Tech., vol. 12, no. 4, pp. 690-699, April 1994.), of record.

Shieh discloses a polarization control method and system (See for example Figures 1-2; col. 3, line 4-col. 4, line 27) comprising a first optical transmission medium capable of receiving an input optical signal having an input state of polarization (See 110 in Figure 1, which is in air); a second optical transmission medium capable of receiving an output optical signal having an output state of polarization from a last one of the waveplates (See 126 in Figure 1, which is in air); receiving an input optical signal at a first waveplate

(See 110, 100 in Figure 1), the input optical signal having a state of polarization associated therewith; selecting a first rotation direction for the first waveplate (See 100 in Figure 1); rotating the first waveplate along the first rotation direction to adjust the state of polarization of the input optical signal (See 100 in Figure 1; col. 3, lines 27-58); monitoring a feedback signal to assess the efficacy of rotating the first waveplate (See 124, 116 in Figure 1); and continuing rotation of the first waveplate while the feedback signal satisfies a first condition (See col. 3, line 27-col. 4, line 3, wherein the first condition may refer to one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced). Shieh additionally discloses ceasing the continued rotation of the first waveplate once the feedback signal does not satisfy the first condition (See col. 3, line 59-col. 4, line 3); selecting a second waveplate (See 102 in Figure 1); selecting an initial rotation direction for the second waveplate (See 102 in Figure 1); rotating the second waveplate along the initial rotation direction to adjust the state of polarization (See 102 in Figure 1; col. 3, line 27-col. 4, line 3); monitoring the feedback signal to assess the efficacy of rotating the second waveplate (See 124, 118 in Figure 1); and continuing rotation of the second waveplate while the feedback signal satisfies a second condition (See col. 3, line 27-col. 4, line 3, wherein the second condition may refer to a condition similar to the first condition, i.e. one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced); ceasing the continued rotation of the second waveplate once the feedback signal does not satisfy the second condition (See col. 3, line 59-col. 4, line 3);

selecting a third waveplate (See 104 in Figure 1); selecting an initial rotation direction for the third waveplate (See 104 in Figure 1); rotating the third waveplate along the initial rotation direction to adjust the state of polarization (See 104 in Figure 1; col. 3, line 27-col. 4, line 3); monitoring the feedback signal to assess the efficacy of rotating the third waveplate (See 124, 120 in Figure 1); and continuing rotation of the third waveplate while the feedback signal satisfies a third condition (See col. 3, line 27-col. 4, line 3, wherein the third condition may refer to a condition similar to the first and second conditions, i.e. one of the first mutually exclusive time slot over which only the first waveplate may be adjusted during the dithering process or peak power output being produced); ceasing the continued rotation of the third waveplate once the feedback signal does not satisfy the third condition (See col. 3, line 59-col. 4, line 3); and the initial rotation direction of the second waveplate is the same as the first rotation direction of the first waveplate (See 100, 102 in Figure 1, where the rotation of these waveplates may occur in the same rotation direction or in opposite rotation directions). Shieh further discloses the plurality of waveplates being between 3 and 12 (See Figures 1-2; col. 4, lines 4-20); the waveplates are arranged in serial fashion (See Figures 1-2); the waveplates are adjusted sequentially by the polarization control logic (See 116, 118, 120, 122, 124 in Figure 1; col. 3, line 59-col. 4, line 3); each of the waveplates functions as a quarter waveplate (See col. 3, lines 4-26); the plurality of waveplates comprise a polarization controller (See Figures 1-2); a first subset of the plurality of waveplates comprise a first polarization controller, and a second subset of the plurality of waveplates comprise a second polarization controller (See for example each individual waveplate

100, 102, 104, 106, 200 in Figures 1-2); and some of the waveplates are selected from the group of $LiNbO_3$ components, a liquid crystal, a fiber loop, and a fiber squeezer (See Figures 3-4). Shieh lacks the particulars of the dithering process, such as a first step amount of rotation of the first waveplate and a second step amount of the second waveplate. However, Heismann teaches a conventional polarization controller utilizing a number of waveplates (See for example Figure 1) or an integrated electro-optic controller (See for example Figure 2), wherein either polarization controller may be controlled utilizing a dithering process (See Section V, pages 695-696, Figure 10). In particular, each waveplate may be sequentially dithered about a nominal reference angle using multiple, small, and equal rotational steps (See in particular Figure 10) to tweak the polarization state of the waveplate and maximize or minimize the detected tapped output. The nominal reference angle of the waveplate is adjusted to a new value associated with the rotational position of the waveplate that maximizes or minimizes the detected tapped output, prior to the next waveplate in the sequence being dithered. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the particulars of the dithering process, such as a first step amount of rotation of the first waveplate and a second step amount of the second waveplate, be utilized in the method of Shieh, to provide known and accurate rotation values, and hence retardances/phases, to the waveplate, which may be referenced and adjusted by the feedback circuit.

10. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann.

Shieh in view of Heismann discloses the invention as set forth above in Claim 1, except for the first step amount being between 2-3 degrees. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first step amount being between 2-3 degrees, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to have the first step amount be between 2-3 degrees, to provide high resolution in retardances/phases that are generated by the rotation of the waveplate. *In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235.*

11. Claims 8-13, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann.

Shieh in view of Heismann discloses the invention as set forth above in Claim 1, 17, except for the method further including further rotating the first or second waveplate along their first rotation direction if the feedback signal satisfies a second condition or third condition respectively; selecting a reverse rotation direction if the feedback signal does not satisfy the second condition or third condition respectively; and rotating the first or second waveplate a second or third step amount along the reverse rotation direction if the feedback signal does not satisfy the second condition or third condition respectively. However, Heismann further teaches that during the dithering process (See Section V, Pages 695-696) used to control the various waveplates in the polarization controller, each of the waveplates may be dithered around their current rotation value and measuring the resulting polarized output to determine the local gradient at that current rotation value.

Thus, during a particular time period (See for example stepped increase in phase of first waveplate in Figure 10) of the dithering of a particular waveplate, the waveplate is rotatedly stepped in a particular rotation direction until that time period has passed. Outside of this time period (See for example stepped decrease in phase of first waveplate in Figure 10), the waveplate is rotatedly stepped in the opposite direction over a second time period. Thus, during this dithering, feedback from the output is used to maximize or minimize the intensity in the desired state of polarization required from the polarization controller. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the method of Shieh in view of Heismann further include further rotating the first or second waveplate along their first rotation direction if the feedback signal satisfies a second condition or third condition respectively; selecting a reverse rotation direction if the feedback signal does not satisfy the second condition or third condition respectively; and rotating the first or second waveplate a second or third step amount along the reverse rotation direction if the feedback signal does not satisfy the second condition or third condition respectively, as additionally taught by Heismann, to allow for fast stabilization of the state of polarization of the input beam.

12. Claims 14-16, 19, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann.

Shieh in view of Heismann discloses the invention as set forth above in Claims 1, 8, 17, except for the second step amount having a value double the first step amount, the first and second step amount being equal and the third step being double the first step amount, rotation of the second waveplate includes incrementing by the second step

amount for each rotation, or the first and second conditions being monotonically increasing or decreasing conditions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the second step amount have a value double the first step amount or the first and second conditions be monotonically increasing or decreasing conditions, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to have the second step amount have a value double the first step amount, the first and second step amount be equal and the third step being double the first step amount, rotation of the second waveplate includes increment by the second step amount for each rotation, or the first and second conditions be monotonically increasing or decreasing conditions, to increase the stabilization speed of the controller, while allowing for any arbitrary setting of the state of polarization of the incident light. *In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235.*

13. Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh.

Shieh discloses the invention as set forth above in Claim 22, except for the first, second, and third rotation directions all being clockwise or counterclockwise. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first, second, and third rotation directions all be clockwise or counterclockwise, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to have the first, second, and

third rotation directions all be clockwise or counterclockwise, to allow for synchronized setting of the various waveplates in the controller, while speeding the stabilization speed of the controller. *In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235.*

14. Claims 31-34, are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann.

Shieh discloses the invention as set forth above in Claim 22, except for the first, second, and third conditions being selected such that loss control effects are minimized or the state of polarization are confined with a zone of acceptability, such as suppression of unwanted orthogonal polarization of between –5 and –40 dB. However, Heismann teaches a conventional polarization controller utilizing a number of waveplates (See for example Figure 1) or an integrated electro-optic controller (See for example Figure 2), wherein either polarization controller may be controlled utilizing a dithering process (See Section V, pages 695-696, Figure 10). In particular, each waveplate may be sequentially dithered about a nominal reference angle using multiple, small, and equal rotational steps (See in particular Figure 10) to tweak the polarization state of the waveplate and maximize or minimize the detected tapped output. In performing such dithering process, the unwanted orthogonal state of polarization may be suppressed to below –20 dB (See Section VI, Pages 696-697). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first, second, and third conditions being selected such that loss control effects are minimized or the state of polarization are confined with a zone of acceptability, such as suppression of unwanted orthogonal polarization of between –5 and –40 dB, as taught by Heismann, in the method

of Shieh, for the purpose of providing full and complete transformation of the incident light into the desired state of polarization without interference from the orthogonally polarized light.

15. Claims 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh.

Shieh discloses the invention as set forth above in Claim 22, except for an input optical fiber and an output single mode optical fiber to input and output optical signals to and from the controller, respectively. However, the use of such single mode optical fibers to provide incident signal beams to the controller and receive output signal beams from the controller are well known in the art. Official notice is taken. One would have been motivated to include an input optical fiber and an output single mode optical fiber to input and output optical signals to and from the controller, respectively, to provide compatibility to existing optical communications systems, while allowing for flexible routing of the incident light to and from the polarization controller.

16. Claims 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann.

Shieh discloses the invention as set forth in Claim 22, except for rotating the first waveplate along the first rotation direction if the feedback signal satisfies a first condition; selecting a reverse rotation direction if the feedback signal does not satisfy the first condition; and rotating the first waveplate a second step amount along the reverse rotation direction if the feedback signal does not satisfy the second condition. However, Heismann further teaches that during the dithering process (See Section V, Pages 695-696) used to control the various waveplates in the polarization controller, each of the

waveplates may be dithered around their current rotation value and measuring the resulting polarized output to determine the local gradient at that current rotation value. Thus, during a particular time period (See for example stepped increase in phase of first waveplate in Figure 10) of the dithering of a particular waveplate, the waveplate is rotatedly stepped in a particular rotation direction until that time period has passed. Outside of this time period (See for example stepped decrease in phase of first waveplate in Figure 10), the waveplate is rotatedly stepped in the opposite direction over a second time period. Thus, during this dithering, feedback from the output is used to maximize or minimize the intensity in the desired state of polarization required from the polarization controller. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the method of Shieh further include further rotating the first waveplate along the first rotation direction if the feedback signal satisfies a first condition; selecting a reverse rotation direction if the feedback signal does not satisfy the first condition; and rotating the first waveplate a second step amount along the reverse rotation direction if the feedback signal does not satisfy the second condition, as additionally taught by Heismann, to allow for fast stabilization of the state of polarization of the input beam.

17. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shieh in view of Heismann.

Shieh in view of Heismann discloses the invention as set forth above in Claim 40, except for the predetermined polarization criterion is a zone of acceptability, such as suppression of unwanted orthogonal polarization of between –5 and –40 dB. However,

Heismann additionally teaches a conventional polarization controller utilizing a number of waveplates (See for example Figure 1) or an integrated electrooptic controller (See for example Figure 2), wherein either polarization controller may be controlled utilizing a dithering process (See Section V, pages 695-696, Figure 10). In particular, each waveplate may be sequentially dithered about a nominal reference angle using multiple, small, and equal rotational steps (See in particular Figure 10) to tweak the polarization state of the waveplate and maximize or minimize the detected tapped output. In performing such dithering process, the unwanted orthogonal state of polarization may be suppressed to below –20 dB (See Section VI, Pages 696-697). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the predetermined polarization criterion be a zone of acceptability, such as suppression of unwanted orthogonal polarization of between –5 and –40 dB, as taught by Heismann, in the system of Shieh in view of Heismann, for the purpose of providing full and complete transformation of the incident light into the desired state of polarization without interference from the orthogonally polarized light.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

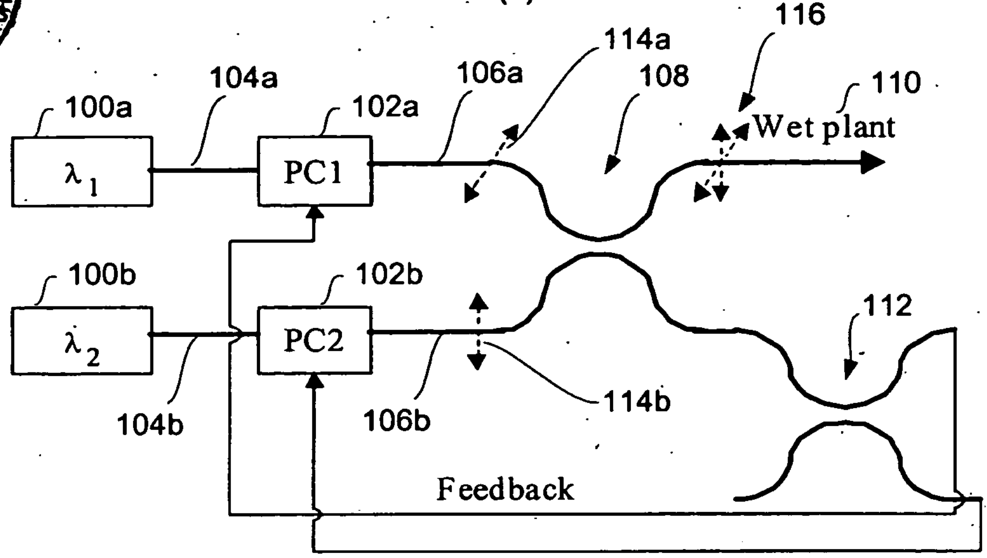
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arnel C. Lavarias

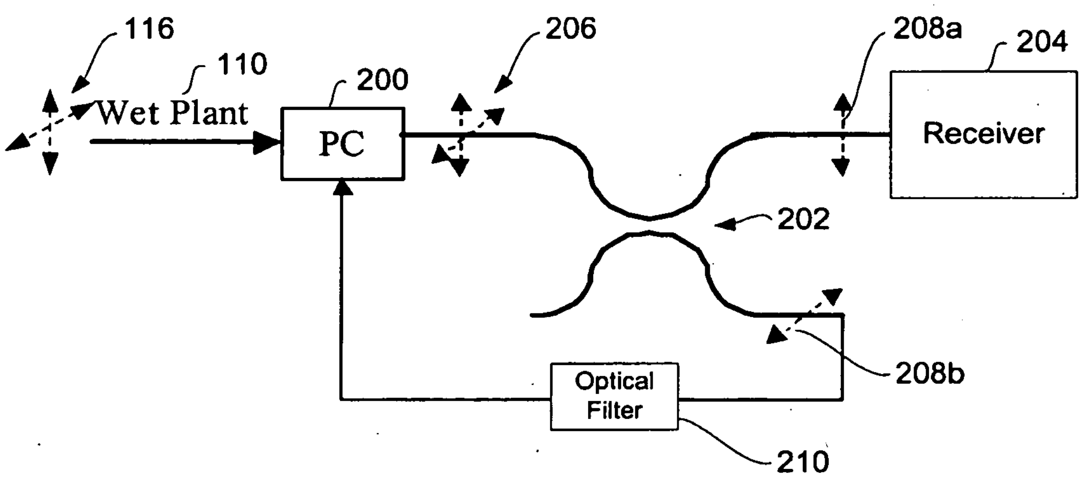
Arnel C. Lavarias
Patent Examiner
Group Art Unit 2872
3/14/06

FIG. 2(a)



Drawing Changes Approved 3/13/06

FIG. 2(b)
(Prior Art)



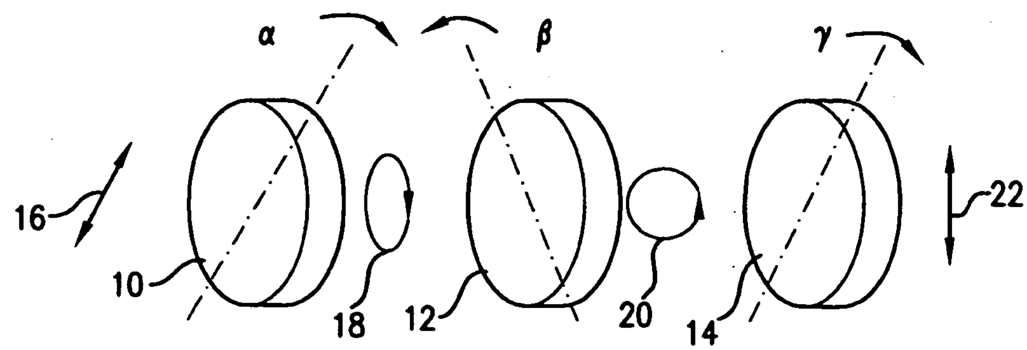


FIG.1A

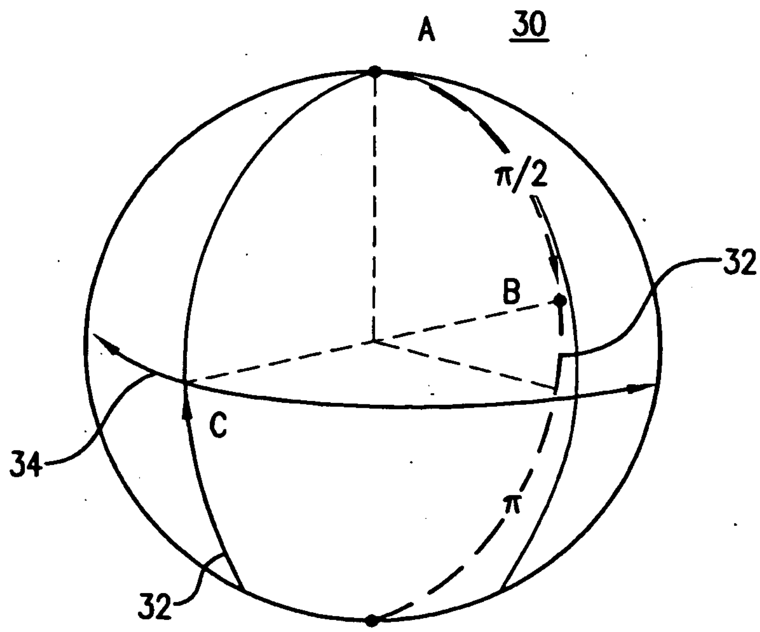


FIG.1B

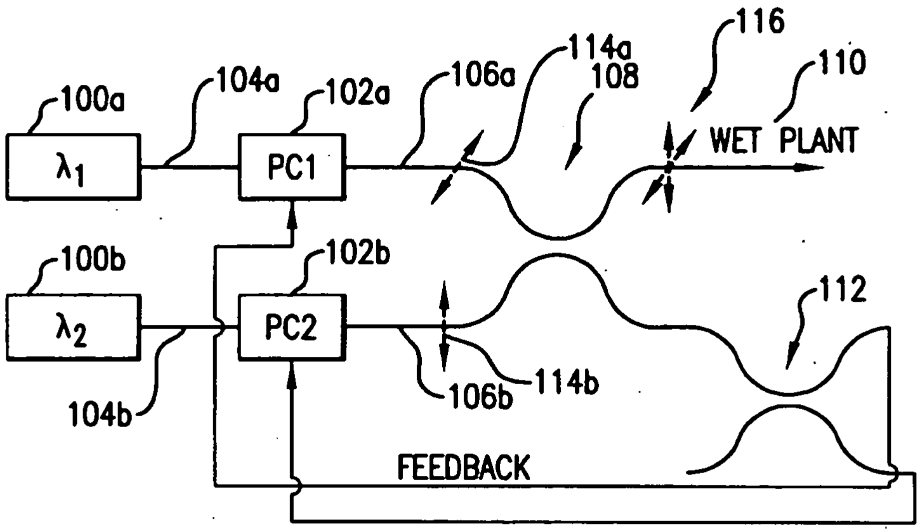


FIG.2A

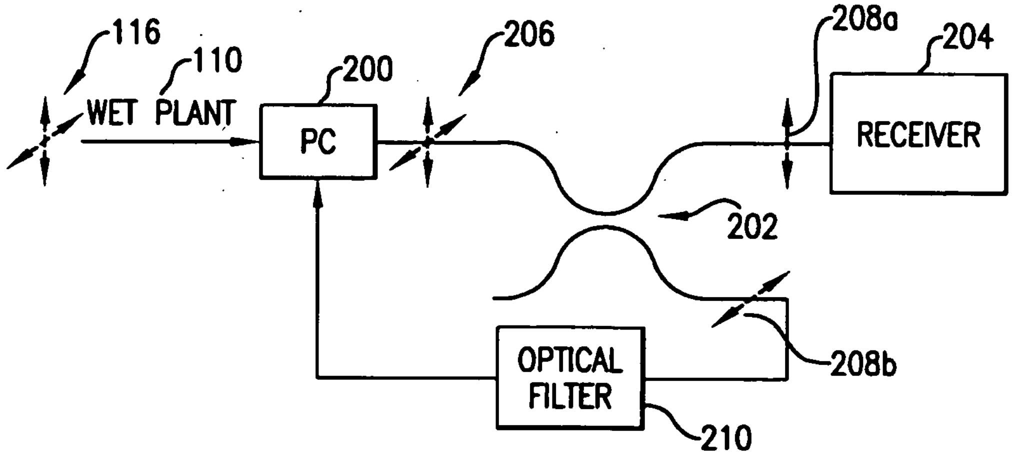


FIG.2B

(PRIOR ART)

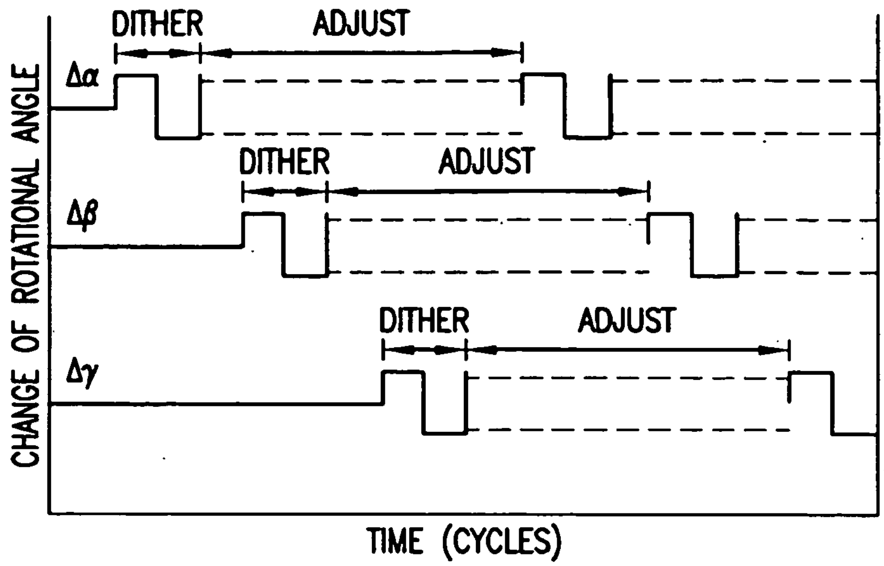


FIG.3

(PRIOR ART)

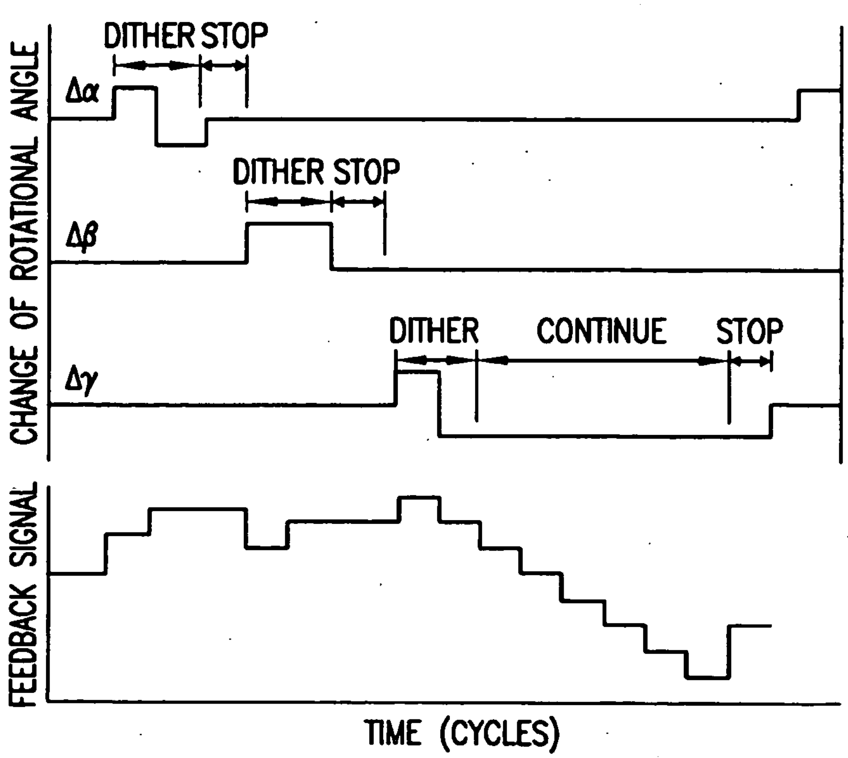


FIG.5

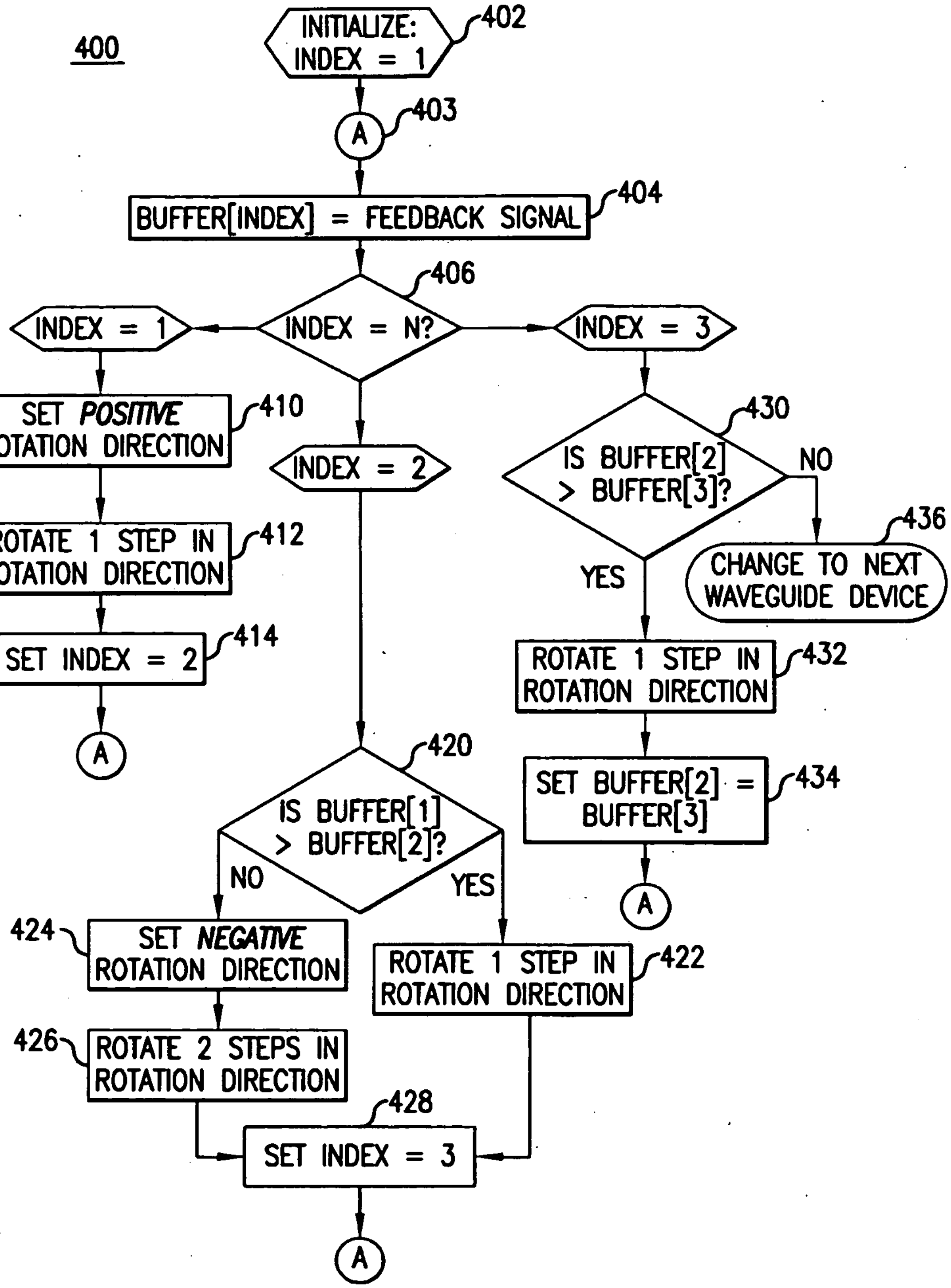

400
INITIALIZE: INDEX = 1
402
A
403
BUFFER[INDEX] = FEEDBACK SIGNAL
404
INDEX = N?
406
INDEX = 1
SET POSITIVE ROTATION DIRECTION
410
ROTATE 1 STEP IN ROTATION DIRECTION
412
SET INDEX = 2
414
A
INDEX = 2
IS BUFFER[1] > BUFFER[2]?
420
NO
YES
SET NEGATIVE ROTATION DIRECTION
424
ROTATE 2 STEPS IN ROTATION DIRECTION
426
ROTATE 1 STEP IN ROTATION DIRECTION
422
SET INDEX = 3
428
A
INDEX = 3
IS BUFFER[2] > BUFFER[3]?
430
NO
CHANGE TO NEXT WAVEGUIDE DEVICE
436
YES
ROTATE 1 STEP IN ROTATION DIRECTION
432
SET BUFFER[2] = BUFFER[3]
434
A

FIG.4

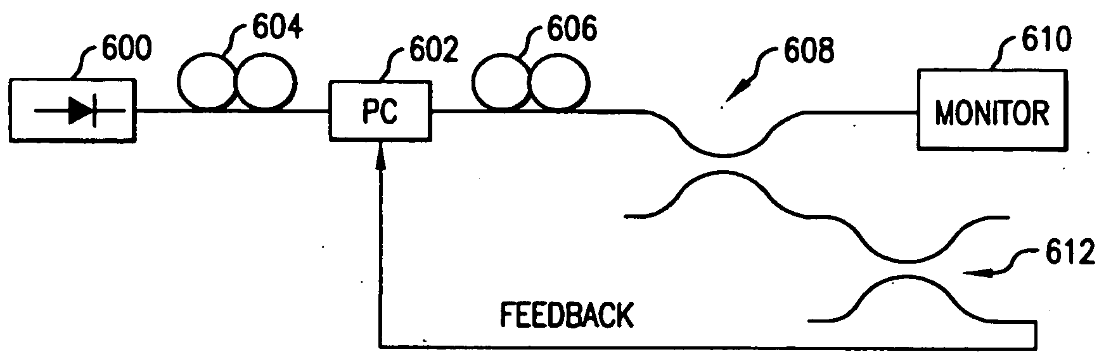


FIG.6

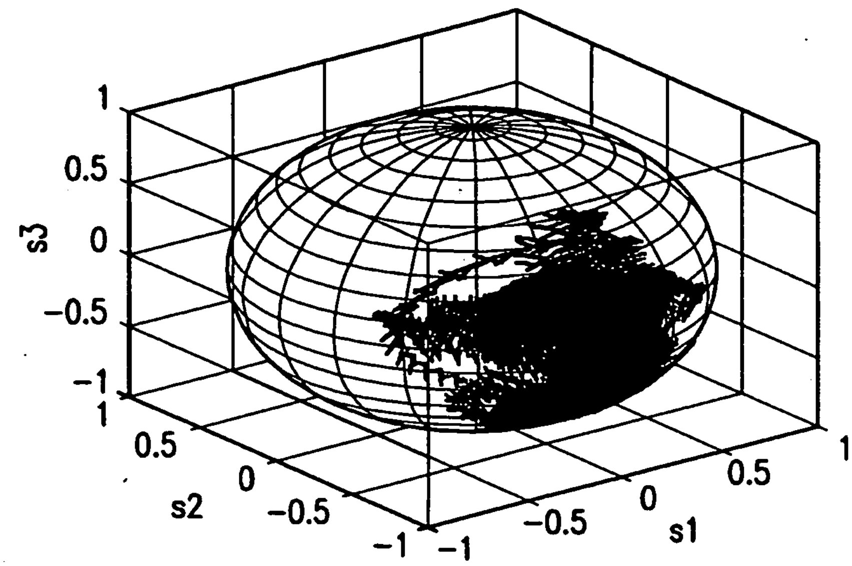


FIG.7A-1

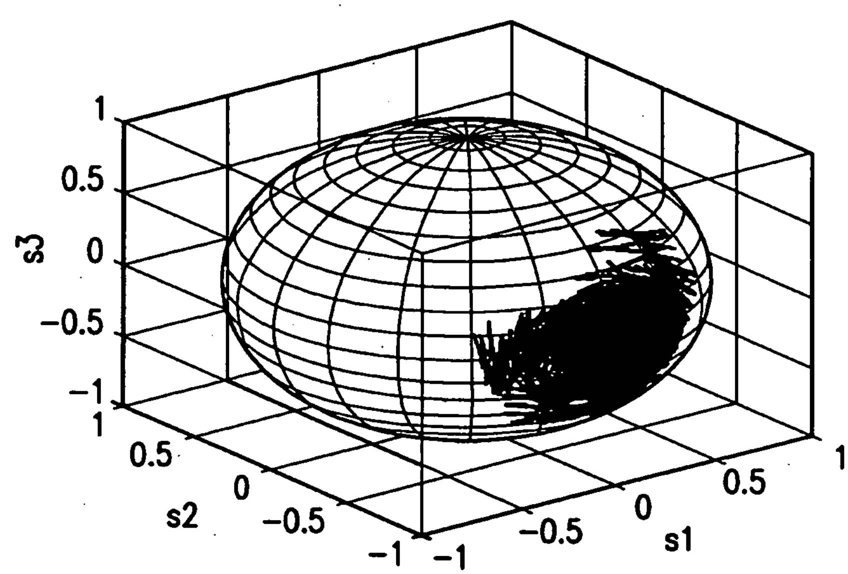


FIG.7A-2

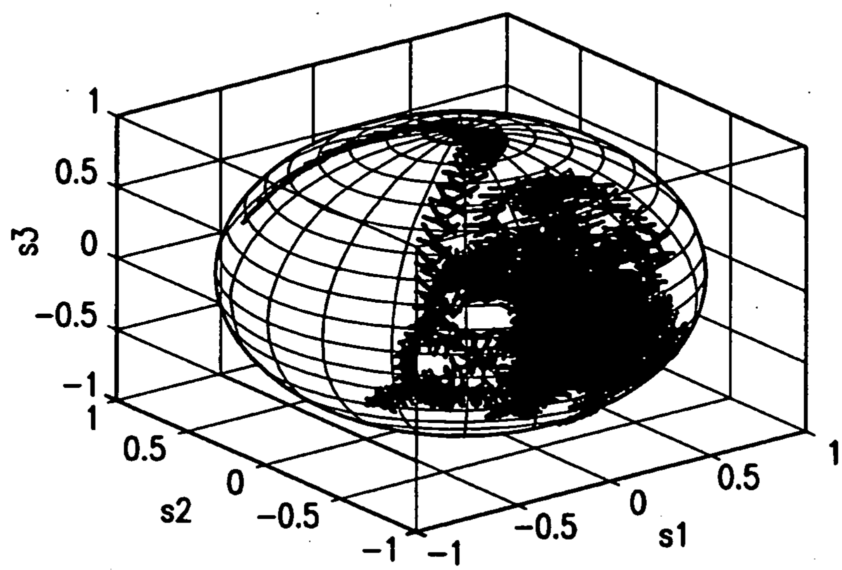


FIG.7B-1

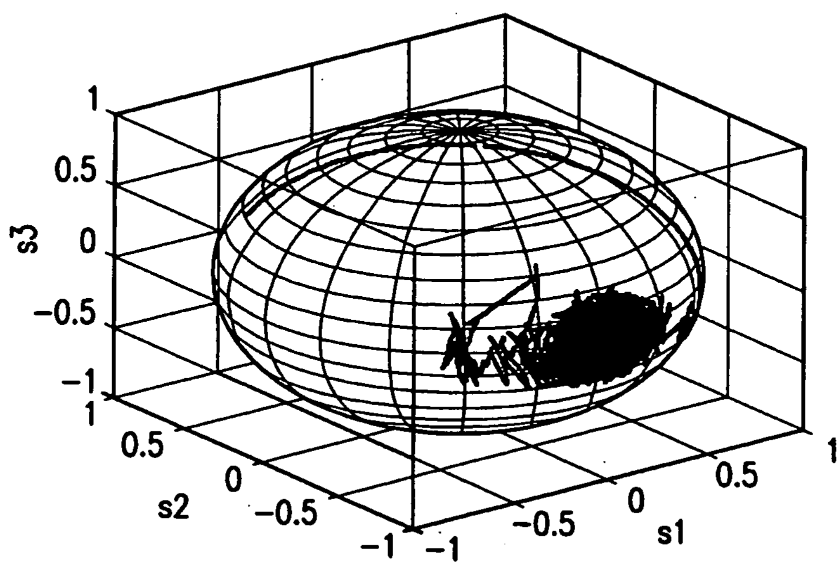


FIG.7B-2

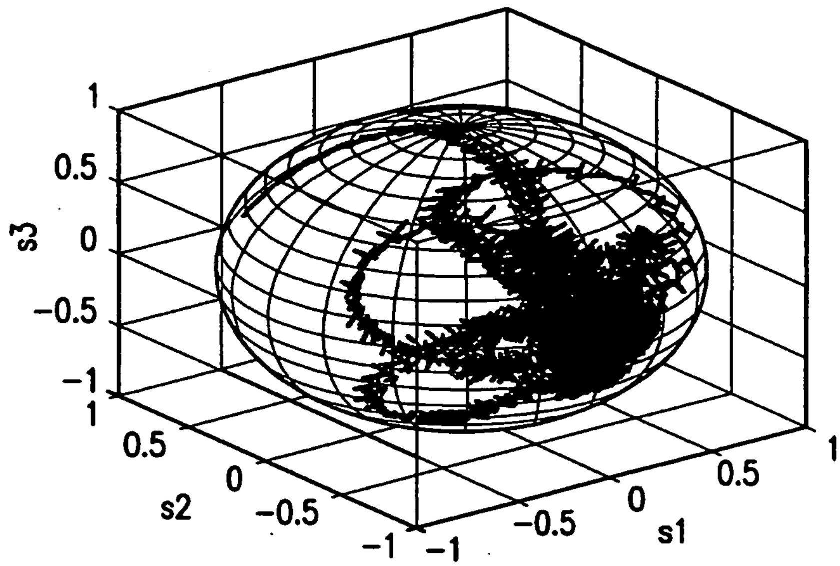


FIG.7C-1

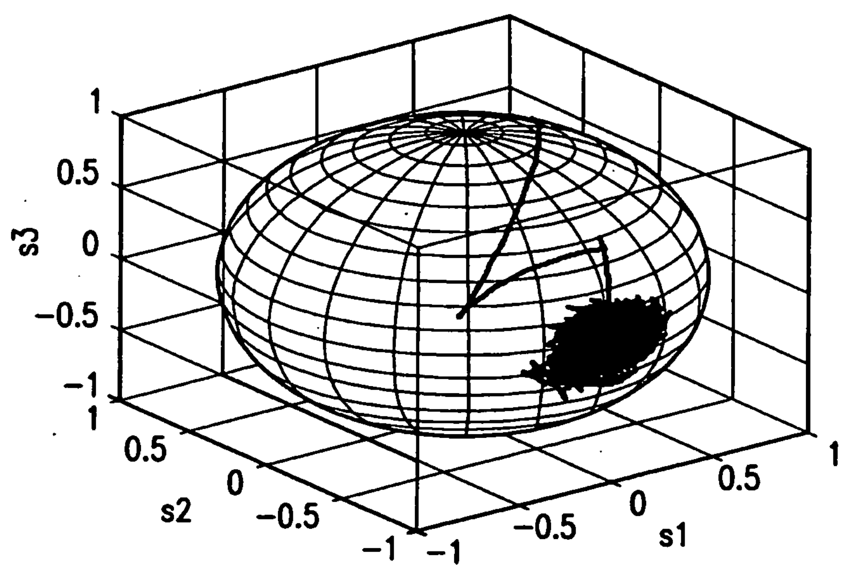


FIG.7C-2

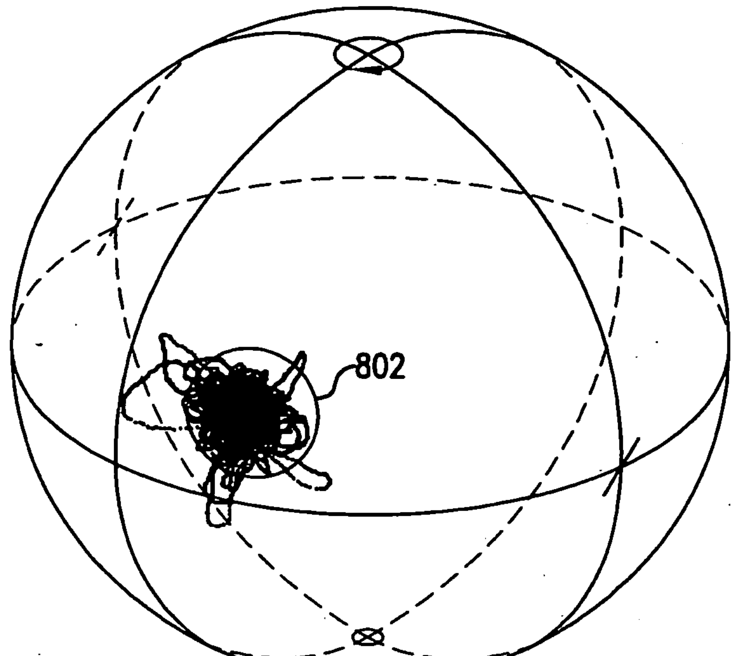


FIG.8A

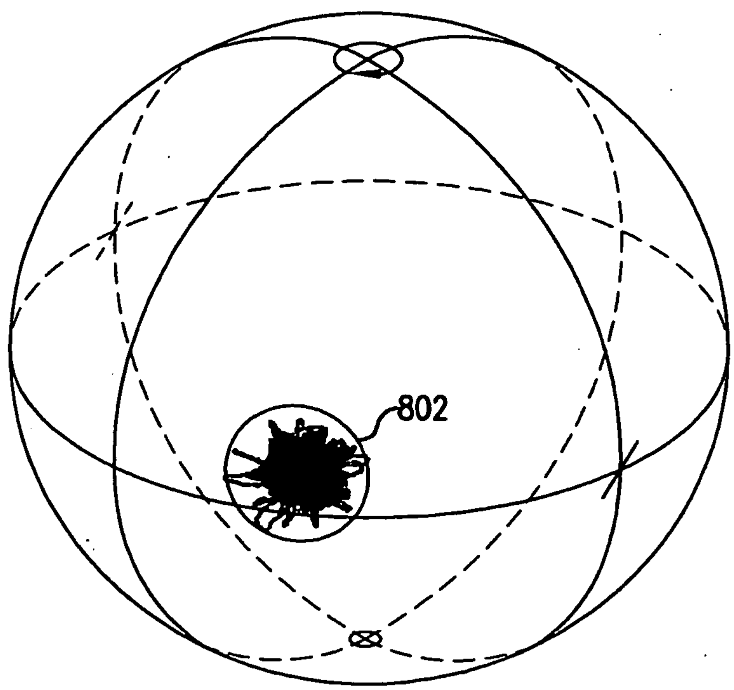


FIG.8A

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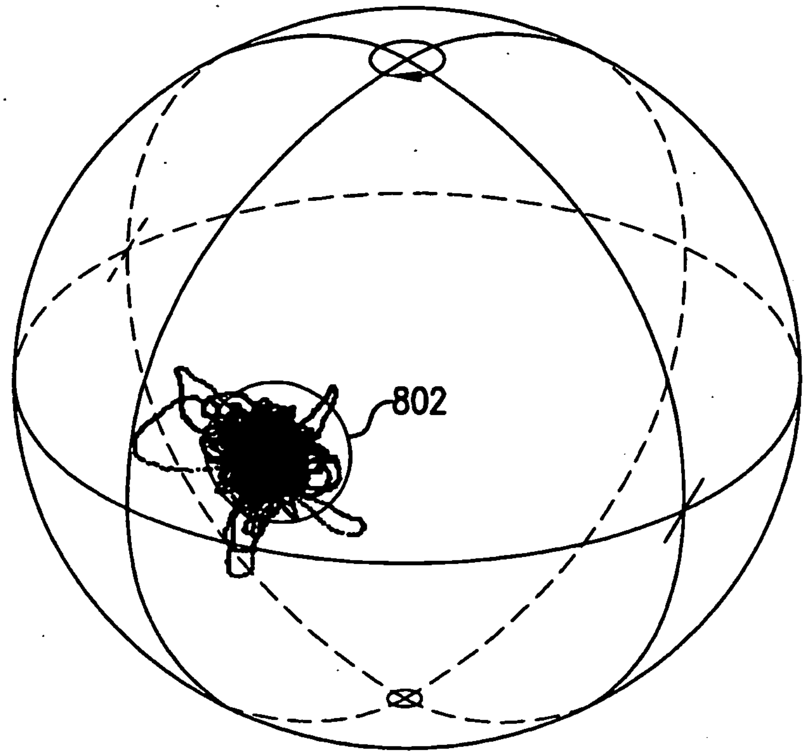

FIG.8A

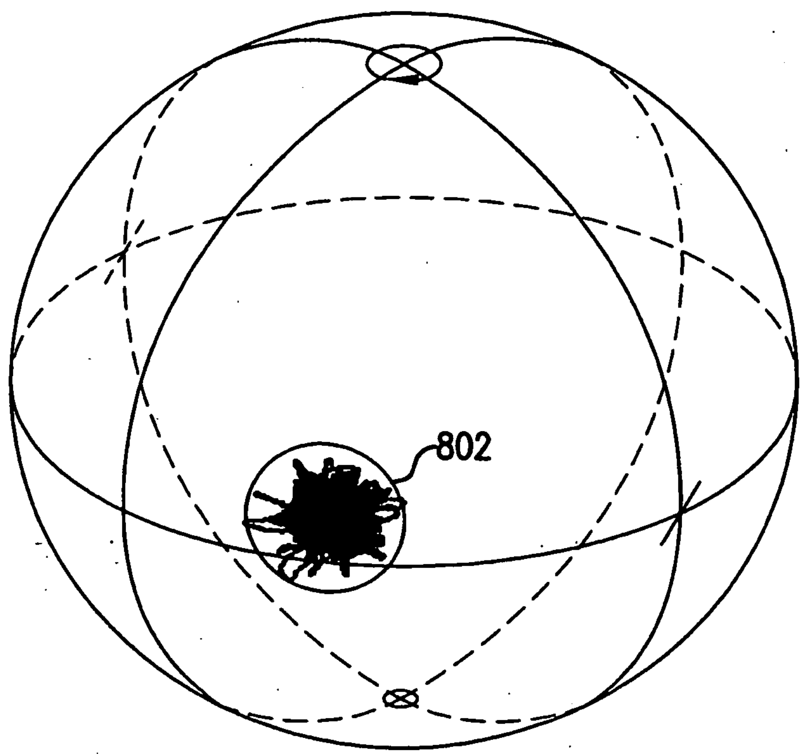

FIG.8B